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Die Aenderung des Projektionssystems der schweizerischen Landesvermessung. Bern, 1903. 8vo, 117 pp., V tables, and map.

This work has for its underlying object the mathematical presentation of a new system of projection which is adaptable to the construction of the topographic map of Switzerland. In connection with the discussion of the proposition for the introduction of the new system, the principles of the projections that have been developed since the beginning of the nineteenth century, for the purposes of topographical mapping, are set forth; and a summary statement is made of the projections that are employed at the present time in the different countries.

The essential part of the book is that part which is devoted to the development of the principles of the new system of projection under the heading "The oblique axis cylindric-projection with preserved angles, and its application to Switzerland."

Switzerland is of an extent a little less than two degrees in latitude and a little more than four degrees in longitude, as shown by the map which accompanies the work to illustrate the various projection systems which have been applied by that country. The centre or zero point of the projection is taken at Bern, which is in the western central portion of the country. Bessel's dimensions of the terrestrial spheroid are accepted.

Formulæ for the transfer from a spheroidal surface to that of a spherical surface are first developed: The condition that a differential triangle, in being transferred from the spheroid to the sphere with preserved angles, carries with it the further condition that the ratio of any two sides of the triangle of the spheroid equals the ratio of the corresponding two sides when transferred to the sphere; also, on account of the conditions of conformity, the meridians of the spheroid and sphere cut the corresponding parallel circles at right angles, and $\frac{dl}{dL}$ the ratio of the distance between two meridians on the spheroid to the corresponding distance on the sphere is constant and independent of the latitude. Making use of these principals, the required formulæ are deduced.

By these formulæ the latitude and longitude of a position on the sphere are deduced from the latitude and longitude of the corresponding position on the spheroid. Also the azimuth of a line on the sphere is determined from the azimuth of the corresponding line on the spheroid, and the magnification ratio of the length of a great circle arc on the sphere to the length of the geodetic line on the spheroid is found.

After the completion of the transfer from the spheroid to the sphere, formulæ are developed for the purpose of making a further transfer from the sphere to the plane under the restriction that angles are still to be preserved. First, the latitude and longitude of a position on the sphere being assumed, the spherical co-ordinates y and x are determined with reference to the zero meridian and the great circle normal to it through the zero point of the chart. This latter circle is called the base circle. From y, x, the plane co-ordinates y', x' are determined in the oblique axis cylindric-projection system. Conversely y', x' being given, formulæ are derived giving y, x.

The angle formed by a great circle perpendicular to the base circle and a meridian is called the meridian convergence for the point of intersection. This angle is represented in the plane by the angle between the projected meridian through the point and a parallel to the x axis or the projected zero meridian. The value of the meridian convergence is derived in terms of y', x'.

The azimuth reduction and the magnification ratio being deduced, the work closes with some examples applying the method to the transference, first from the spheroid to the sphere, and then from the sphere to the plane. G. W. L.